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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/642,846	08/18/2003	Michael Ben Sellers	133859 (MHM 14930US01)	4471

23446 7590 10/03/2005

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EXAMINER	
FETZNER, TIFFANY A	

ART UNIT	PAPER NUMBER
2859	

DATE MAILED: 10/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/642,846	SELLERS ET AL.	
	Examiner	Art Unit	
	Tiffany A. Fetzner	2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *8/08/2005*.

2a)☒ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-10,12-15 and 17-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3, 5-10, 12-15, and 17-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *08/08/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED First Action after RCE

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on August 8th 2005, with a newly provided information disclosure statement (IDS) which was also submitted on August 8th 2005 has been entered.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 08/08/2005 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the examiner has considered the information disclosure statement. The examiner notes that the newly supplied prior art from the August 8th 2005 raises new rejections due to the fact that the applicant's actual inventive structure as shown in applicant's figure 2 is not recited in independent claims 1, 9, or 14 in a manner which removes the prior art from the August 8th 2005 submitted IDS from reading on the recited claims.

Drawings

3. The Formal drawings submitted December 23rd 2003 have been approved by the official draftsperson and are acceptable to the examiner.

Canceled Claims

4. **Claims 4, 11,** and **16** are canceled as per applicant's April 8th 2005 response, which amends the independent claims to include the canceled limitation.

Response to Arguments

5. Fix The **Edelstein et al., Hirata,** and **Feenan** references clearly teach and show the inner and outer gradient coil assemblies as two separate components. The examiner also notes that contrary to applicant's arguments on pages 2-4 of the December 21st 2004 remarks, or the April 8th 2005 response that **amended claim 1** fails to actually recite the inner and outer gradient coil assemblies as "individually separate" components.

6. In order to clarify the differences between applicant's figure 2, and the applied prior-art references below from the August 8th 2005 IDS submission. The examiner suggests that applicant consider the following **proposed changes**:

A) Amend claim 1 as follows:

Claim 1 --- A magnetic resonance imaging (MRI) device, comprising:

an inner gradient coil assembly **directly adjacent** ~~[proximate]~~ a patient positioning area **along the horizontal length of the inner gradient coil assembly**;

an outer gradient coil assembly **directly adjacent** ~~[proximate]~~ a magnet assembly **along the horizontal length of the outer gradient coil assembly**; and

a damping layer sandwiched **directly** between said inner and outer gradient coil assemblies**, along the horizontal length of the inner and outer gradient coil assemblies,** said damping layer comprising ~~at least one~~ **separate** ~~viscoelastic layer consisting of at least one of foam or rubber~~ **at least two vertically separated non-contacting viscoelastic layers, with each viscoelastic layer consisting of** at least one of foam or rubber, **and** at least one high modulus cylinder sandwiched between said two **vertically separated non-contacting** viscoelastic layers. ---

B) **Cancel claim 2**

C) Amend the dependency of **claim 3** to depend from **claim 1** so that **claim 3** is:

Claim 3 ---The MRI device of **claim 3**, wherein said high modulus cylinder is composed of at least one of ceramic, glass filament wound tube, carbon fiber, and another non-conductive material exhibiting a high modulus. **---**

D) **Amended claims 5-7** of the July 26th 2005 action.

Claim 5 --- The MRI device of **claim 1**, further comprising at least one additional damping layer **consisting of at least one of foam or rubber** positioned between said

outer gradient coil assembly and said magnet assembly**, along the horizontal length of the outer gradient coil assembly and said magnet assembly**. ---

Claim 6 --- The MRI device of **claim 1**, further comprising at least one additional damping layer **consisting of at least one of foam or rubber** positioned between said inner gradient coil assembly and said patient positioning area**, along the horizontal length of the inner gradient coil assembly and said patient positioning area**. ---

Claim 7 --- The MRI device of **claim 1**, wherein said damping layer comprises a plurality of high modulus cylinders, and wherein each of said plurality of high modulus cylinders is positioned between at least two **vertically separated non-contacting** viscoelastic layers **consisting of at least one of foam or rubber.** ---

E) Keep Examiner **Amended claim 8** of the July 26th 2005 action.

Claim 8 --- The MRI device of **claim 1**, wherein said inner gradient coil assembly generates a magnetic field gradient in response to the presence of a magnetic field generated by said magnet assembly; and wherein said outer gradient coil assembly shields the magnetic field gradient generated by said inner gradient coil assembly from radiating outwardly from the MRI device. ---

F) Amend **claim 9** as follows:

Claim 9 --- A method of manufacturing a magnetic resonance imaging (MRI) device, comprising:

forming a space between a first gradient coil assembly and a second gradient coil assembly;

positioning at least one high modulus cylinder in the space before pouring a liquid viscoelastic material **consisting of at least one of foam or rubber** into the space;

allowing the liquid viscoelastic material to solidify within the space in order to form a **vertically separated** damping layer **along the horizontal length of the space** between the first gradient coil assembly and the second gradient coil assembly, **with the damping layer comprising** at least one high modulus cylinder sandwiched between **at least two vertically separated non-contacting viscoelastic layers, with each viscoelastic layer consisting of** at least one of foam or rubber. ---

G) **Cancel claim 10.**

H) Keep the **Examiner Amended claim 12** of the July 26th 2005 action.

Claim 12 --- The method of **claim 10**, wherein the high modulus cylinder is at least one of ceramic, glass filament wound tube, and carbon fiber. ---

I) Amend **claim 13** as follows:

Claim 13 --- The method of **claim 9**, further comprising positioning **a** plurality of high modulus cylinders in the space **before the pouring step** such that each of the plurality of high modulus cylinder does not directly contact another high modulus cylinder, the first gradient coil, and the second gradient coil. ---

J) Amend **claim 14** as follows:

Claim 14 --- A magnetic resonance imaging (MRI) device, comprising:

a magnet assembly **configured to generate** a magnetic field;

a patient positioning area;

a first gradient coil assembly **directly adjacent** [~~proximate~~] said patient positioning area, **along the length of the first gradient coil assembly**; configured to produce a magnetic field gradient in response to the presence of a magnetic field generated by said magnet assembly;

a second gradient coil assembly **directly adjacent** [~~proximate~~] said magnet assembly, **along the length of the first gradient coil assembly**, configured to block the magnetic field gradient generated by said first gradient coil assembly from radiating outwardly from the MRI device; and

a damping layer sandwiched between said first and second gradient coil assemblies, **along the length of the inner and outer gradient coil assemblies,** wherein said damping layer comprises at least one high modulus cylinder sandwiched between two **vertically separated non-contacting** viscoelastic layers **consisting of at least one of foam or rubber**. ---

K) Keep **Examiner Amended claim 15,** of the July 26th 2005 action.

Claim 15 --- The MRI device of **claim 14,** wherein said high modulus cylinder is composed of at least one of ceramic, glass filament wound tube, and carbon fiber. ---

L) **Amend claims 17-19** of the July 26th 2005 action.

Claim 17 --- The MRI device of **claim 14**, further comprising at least one additional damping layer **consisting of at least one foam or rubber** positioned between said second gradient coil assembly and said magnet assembly, **along the horizontal length of the outer gradient coil assembly and said magnet assembly**. ---

Claim 18 --- The MRI device of **claim 14**, further comprising at least one additional damping layer **consisting of at least one of foam or rubber** positioned between said first gradient coil assembly and said patient positioning area, **along the horizontal length of the inner gradient coil assembly and said patient positioning area**. ---

Claim 19 --- The MRI device of **claim 14**, wherein said damping layer comprises a plurality of high modulus cylinders, and wherein each of said plurality of high modulus

cylinders is positioned between at least two **vertically separated non-contacting** viscoelastic layers **consisting of at least one of foam or rubber**. ---

M) Keep **Examiner Amended claim 20,** of the July 26th 2005 action.

Claim 20 --- The MRI device of **claim 14**, further comprising a radiofrequency (RF) coil assembly **configured to** transmit a radiofrequency pulse and detect a plurality of MR signals induced from a subject being imaged. ---

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. **Amended Claims 1, 5, 8, 14, 17,** and **20** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Takeshi et al., JP patent 1303140** published December 7th 1989. The examiner notes that in order for applicant to overcome the rejections based upon this reference which was provided by applicant to the Examiner with the August 8th 2005 IDS submission, applicant must provide a complete certified English translations of this reference to the examiner, with the next response, because the Foreign figures and the English abstract meet the limitations of these claims, as best as the examiner can determine based upon what is shown in the reference, and what the examiner currently understands the reference to teach.

11. With respect to **Claim 1**, and corresponding MRI system **claim 14**, **Takeshi et al.,** shows "A magnetic resonance imaging (MRI) device", [See title and figure 8] "comprising: an inner gradient coil assembly proximate a patient positioning area;" [See figures 1 and figure 2] "an outer gradient coil assembly proximate a magnet assembly;" {See figures 1, 2, and 8 in combination with one another] "and a damping layer sandwiched between said inner and outer gradient coil assemblies" [See abstract, figures 1 and 2].

12. **Takeshi et al., lacks directly teaching that** said damping layer comprises at least one **separate** viscoelastic layer **consisting of** at least one of foam or rubber" verbatim because the abstract does not use the term "viscoelastic" however the abstract does describe the material as being a material which does not damage the stability of a magnetic field, and because non-magnetic foam or rubber is a viscoelastic material, which intrinsically 'does not damage the stability of a magnetic field' it would have been obvious to one of ordinary skill in the art at the time that the invention was made that the applicant's "viscoelastic layer **consisting of** at least one of foam or rubber", is suggested by the material taught in the **Takeshi et al.,** English abstract. If applicant wishes to argue this feature, a complete English translation of the text of this reference is needed to verify the specific scope of the **Takeshi et al.,** damping material.

13. With respect to **Claim 5**, and corresponding **claim 17** which respectively depends from **claims 1** and **14**, **Takeshi et al.,** teaches and shows "at least one additional damping layer positioned between said outer gradient coil assembly and said

magnet assembly." [See abstract, in combination with figures 1 and 2 where an interlayer material 4/damping layer 1c is provided between each of the gradient coils in the assembly.] The same reasons for rejection, and obviousness that apply to **claims 1, 14** also apply to **claims 5,** and **17** and need not be reiterated.

14. With respect to **Claim 8**, **Takeshi et al.,** shows, teaches and / or suggests from the combination of **figures 8, 1** and **2**, and the teachings of the abstract that "said inner gradient coil assembly generates a magnetic field gradient in response to the presence of a magnetic field generated by said magnet assembly; and wherein said outer gradient coil assembly shields the magnetic field gradient generated by said inner gradient coil assembly from radiating outwardly from the MRI device", because vibrations/oscillations between respective coils or coil layers are absorbed and dampened in the **Takeshi et al.,** reference. The same reasons for rejection, and obviousness that apply to **claim 1,** also apply to **claims 8** and need not be reiterated.

15. With respect to **Claim 20**, **Takeshi et al.,** shows, teaches and / or suggests from the combination of **figures 8,** and **7**, and the teachings of the abstract "a radiofrequency (RF) coil assembly **configured to** transmit a radiofrequency pulse and detect a plurality of MR signals induced from a subject being imaged." The same reasons for rejection, and obviousness that apply to **claim 14,** also apply to **claims 20** and need not be reiterated.

16. **Amended Claims 1, 2, 3, 5, 7, 8, 14, 15, 17,** and **19** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Minas** US patent 6,456,074 issued September 24th 2002, filed January 28th 2000; in view of **Edelstein et al.**, US patent 6,437,568 B1 issued August 20th 2002, filed October 2nd 2000.

17. With respect to **Claim 1**, and corresponding MRI system **claim 14**, **Minas** shows "A magnetic resonance imaging (MRI) device", [See figure 3] "comprising: an inner gradient coil assembly proximate a patient positioning area;" [See gradient main coil 36 of figure 3 col. 5 lines 14-19] "an outer gradient coil assembly proximate a magnet assembly;" [See figure 3 the gradient shield coil 38, col. 5 lines 14-19] "and a damping layer sandwiched between said inner and outer gradient coil assemblies" [See Figure 3 col. 6 lines 1-5 where spaces 32 and 41 of figure 3 within and adjacent to the gradient

coil assembly 28 are filled with noise absorbent matter. The examiner notes that spaces 32 and 42 are located between the inner gradient main coil 36 and the outer gradient shield coil 38.]

18. **Minas lacks directly teaching that "**said damping layer comprises at least one **separate** viscoelastic layer **consisting of** at least one of foam or rubber" verbatim because the reference does not use the term "viscoelastic" however **Edelstein et al** teaches that an acoustic blocking and absorption material such as open-cell foam sold under the name of "soundfoam" by the Soundcoat company is disposed for constrained-layer-damping or (CLD) is applied to the inner and/or outer surfaces of a gradient coil assembly. [See **Edelstein et al** col. 8 lines 33-56] Because the layered "open-cell foam" or "Soundfoam" is a :**separate** viscoelastic layer **consisting of** at least one of foam or rubber" and constitutes "noise absorbent matter" as taught by **Minas**, It would have been obvious to one of ordinary skill in the art at the time that the invention was made that the teachings of these references are combinable because the scope of the **Minas**, references' "noise absorbent matter" includes the "soundfoam" material which as taught by **Edelstein et al.,** is already commercially available to the public through the Soundcoat company, and therefore the limitation of "said damping layer" (i.e. the soundproofing, noise reducing absorbent material which may include a foam, (i.e. soundfoam) "comprising at least one **separate** viscoelastic layer **consisting of** at least one of foam or rubber" is met by the combination of these references.

19. With respect to **Claim 2**, **Minas** suggests and shows that "said damping layer" (i.e. the "noise absorbent matter") "comprises at least one high modulus cylinder", because components 40 of figure 3 represent coupling rings which may be made of glass/epoxy or metallic non-magnetic material, [See **Minas** col. 4 line 25 through col. 5 line 19] which directly suggests the presence of "at least one high modulus cylinder" within the at least one separate damping layer, because **Minas** shows that components 40 are sandwiched between components 36 and 38, within the region of the damping layer spaces 41, and that each of these components comprise gradient assembly 28. [See **Minas** col. 4 line 25 through col. 5 line 19]. Therefore, **Minas** also suggests that the "at least one high modulus cylinder" (i.e. the middle coupling ring 40 which is

boarded on either side by the "noise absorbent matter" 41 is "sandwiched between two" "noise absorbent matter" layers (i.e. two "viscoelastic layers") in the horizontal direction. [See figure 3] The same reasons for rejection, and obviousness that apply to **claim 1** also apply to **claim 2** and need not be reiterated.

20. With respect to **Claim 3**, and corresponding **claim 15** which respectively depends from **claims 1,** and **14**, **Minas** teaches that "said high modulus cylinder is composed of at least one of ceramic, glass filament wound tube, carbon fiber, and another non-conductive material exhibiting a high modulus." [See **Minas** col. 4 line 25 through col. 5 line 19; and figure 3] The same reasons for rejection, and obviousness that apply to **claims 1, 2, 14** also apply to **claims 3,** and **15** and need not be reiterated.

21. With respect to **Claim 5**, and corresponding **claim 17** which respectively depends from **claims 1** and **14**, **Minas** shows from figure 3 "at least one additional damping layer" (i.e. damping layer spaces 32) "positioned between said outer gradient coil assembly" (i.e component 38) "and said magnet assembly" (i.e. see the main magnets 16 in figure 3). The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1, 14** also apply to **claims 5, 17** and need not be reiterated.

22. With respect to **Claim 7**, and corresponding **claim 19** which respectively depends from **claims 1** and **14**, **Minas** suggests from figure 3, that "said damping layer comprises a plurality of high modulus cylinders," (i.e. components 40) "and wherein each of said plurality of high modulus cylinders is positioned between at least two "noise absorbent matter" layers (i.e. two "viscoelastic layers") [See Figure 3, components 41 which surround middle cylinder component 40; and components 32 which surround middle cylinder component 30] The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1, 14** also apply to **claims 7, 19** and need not be reiterated.

23. With respect to **Claim 8**, **Minas** teaches and shows "said inner gradient coil assembly generates a magnetic field gradient in response to the presence of a magnetic field generated by said magnet assembly; and wherein said outer gradient coil assembly shields the magnetic field gradient generated by said inner gradient coil

assembly from radiating outwardly from the MRI device." [See **Minas** col. 4 line 25 through col. 5 line 19; and figure 3, especially col. 4 lines 25-40] The examiner notes that the shielded gradient coil assembly of **Minas** meets this limitation necessarily because an inner gradient coil assembly, which is outer-shielded by definition, performs the function of this claim, set forth by applicant. The same reasons for rejection, and obviousness that apply to **claim 1** also apply to **claim 8** and need not be reiterated.

24. **Amended Claims 1, 2, 6-10, 12-14, 18,** and **19** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Dietz et al.,** US patent application publication 2001/0008516 A1 published January 24th 2002, filed July 3rd 2001; in view of **Edelstein et al.**, US patent 6,437,568 B1 issued August 20th 2002, filed October 2nd 2000.

25. With respect to **Claim 1**, and corresponding MRI system **claim 14**, **Dietz et al.,** shows "A magnetic resonance imaging (MRI) device", [See the abstract, the figure, and page 1 paragraph [0002] through page 2 paragraph [0015].] "comprising: an inner gradient coil assembly proximate a patient positioning area;" [See gradient coils 12 and 14 of the figure since the patient positioning area is the volume inside the gradient coil system.] "an outer gradient coil assembly proximate a magnet assembly;" [See the figure where gradient coil 16, shim assembly coil 18, longitudinal shielding coil 22, transverse shielding coil 24 or the second transverse shielding coil 26 of the gradient coil system are each an "outer gradient coil" with respect to either gradient coil 12, or gradient coil 14; See also page 1 paragraph [0012] through page 2 paragraph [0015]]. "and a damping layer" (i.e. flexible damping structure 34, and / or damping/cooling assemblies 30a, 30b) "sandwiched between said inner and outer gradient coil assemblies" [See the Figure where damping structure 34 is sandwiched between the inner gradient coil 14 and the outer longitudinal gradient coil 16; as well as page 1 paragraph [0012] through page 2 paragraph [0014].]

26. **Dietz et al., lacks directly teaching that** "said damping layer comprises at least one **separate** viscoelastic layer **consisting of** at least one of foam or rubber" verbatim because the reference does not use the term "viscoelastic" however **Dietz et al.,** teaches on page 2 paragraph [0013] that damping structure 34 may be a polyurethane material (i.e. polyurethane is a type of rubber) or a flexible plastic material as denoted

by component 36. Therefore, even though the "viscoelastic term is not explicitly taught, the flexible plastic 36 is suggestive of a "viscoelastic' material and the polyurethane teaching suggests that the material consists of a type of rubber. Therefore, the **Dietz et al.,** reference teaches, shows and suggests that "said damping layer comprises at least one **separate** 'viscoelastic' layer **consisting of** at least one of foam or rubber".

27. With respect to **Claim 2**, the **Dietz et al.,** reference teaches, shows, and suggests that "said damping layer" (i.e. the "flexible plastic or polyurethane material") "comprises at least one high modulus cylinder" (i.e. the cooling conduits 32 are cylindrical in form and embedded within the damping structures, 34, 30a, and 30b). [See **Dietz et al.,** paragraphs [0012], [0014], [0015], and [0016], which directly suggests the presence of "at least one high modulus cylinder" within the at least one separate damping layer, because the **Dietz et al.,** reference shows that cylindrical cooling conduit components 32 are sandwiched between either components 14 and 16 within structure 34 or layer 30a; or between components 18 and 22 within component damping layer 30b.] The examiner notes that each damping structure 34, or 30a, 0r 30b has a region above and below each conduit cylinder which is separate from the cylindrical component, and that the damping material is also located between the cylindrical components. Because the figure suggestively shows at least two layers or regions which are separated by the conduits, the structure of the **Dietz et al.,** figure meets applicants claim. The claim as recited does not require the two separate viscoelastic layers to be "vertically separated and non-contacting", in order to exclude the presence of the damping material between the cylindrical conduits as shown in the **Dietz et al.,** figure. Therefore, **Dietz et al.,** suggests that the "at least one high modulus cylinder" (i.e. the cylindrical cooling conduit(s) 32 is/are "sandwiched between two" suggestively "separate" viscoelastic damping layers.[See the **Dietz et al.,** figure and paragraph [0012] through [0017].] The same reasons for rejection, and obviousness that apply to **claim 1** also apply to **claim 2** and need not be reiterated.

28. With respect to **Claim 6**, and corresponding **claim 18** which respectively depends from **claims 1** and **14**, the **Dietz et al.,** figure suggests (i.e. when component 22, is interpreted as an outer gradient coil, and coil 18 is considered an inner coil

"proximate" to the patient positioning area, with damping layer 30b sandwiched between coils 22 and 18 that damping layer 34 / 30a represents "at least one additional damping layer positioned between said inner gradient coil assembly" (i.e. coil 18) and said patient positioning area", (i.e. the area bounded by coil component 12). The examiner notes that the term "proximate" is broad enough that the **Dietz et al.,** figure suggests applicant's claimed limitation. If applicant desires to require that there are no intervening component layers then applicant should specify that the components are "directly adjacent" to one another. The same reasons for rejection, that apply to **claims 1, 14** also apply to **claims 6, 18** and need not be reiterated.

29. With respect to **Claim 7**, and corresponding **claim 19** which respectively depends from **claims 1** and **14**, the **Dietz et al.,** figure suggests that "said damping layer comprises a plurality of high modulus cylinders, and wherein each of said plurality of high modulus cylinders is positioned between at least two viscoelastic layers." [See the **rejection of claim 2 above**, because the **Dietz et al.,** figure shows a plurality of cylindrical conduits 32.] The same reasons for rejection, obviousness, and motivation to combine, that apply to **claims 1, 2, 14** also apply to **claims 7, 19** and need not be reiterated.

30. With respect to **Claim 8**, **Dietz et al.,** teaches and shows "said inner gradient coil assembly generates a magnetic field gradient in response to the presence of a magnetic field generated by said magnet assembly; and wherein said outer gradient coil assembly shields the magnetic field gradient generated by said inner gradient coil assembly from radiating outwardly from the MRI device." [See **Dietz et al.,** page 1 paragraphs [0004] through [0012]] The examiner notes that the shielded inner/outer gradient coil assembly of **Dietz et al.,** meets this limitation necessarily because an inner gradient coil assembly, which is outer-shielded by definition, performs the function of this claim, set forth by applicant. The same reasons for rejection, and obviousness that apply to **claim 1** also apply to **claim 8** and need not be reiterated.

31. With respect to **Amended Claim 9**, the **Dietz et al.,** reference lacks directly teaching, but does suggest "A method of manufacturing a magnetic resonance imaging (MR1) device, comprising: forming a space between a first gradient coil assembly and a

second gradient coil assembly; pouring a liquid viscoelastic material of at least one of foam and rubber into the space; allowing the liquid viscoelastic material to solidify within the space in order to form a damping layer between the first gradient coil assembly and the second gradient coil assembly". [See **Dietz et al.,** paragraphs [0012] though [0016], especially paragraph [0016]. Additionally se the rejection of claim 1 above.] col. 1 line 5 through col. 8 line 55, the abstract, and figures 3, 7]

32. Additionally, the **Dietz et al.,** reference lacks directly teaching but does suggest from paragraphs [0013] through [0016], that "the liquid viscoelastic material is at least one of rubber and foam" for the same reasons already provided in the **rejection of claim 1** which need not be reiterated. The same reasons for rejection, and obviousness, that apply to **claims 1, 14**, also apply to **claim 9** and need not be reiterated.

33. With respect to **Claim 10**, the **Dietz et al.,** reference lacks directly teaching but does suggest from page 2 paragraphs [0015] and [0016] the step of "positioning at least one high modulus cylinder in the space before said pouring step". The same reasons for rejection, and obviousness, that apply to **claims 1, 9, 14** also apply to **claim 10** and need not be reiterated.

34. With respect to **Claim 12**, the **Dietz et al.,** reference lacks directly teaching but does suggest that "the high modulus cylinder" (i.e. the cooling conduit 32) :is at least one of ceramic, glass filament wound tube, and carbon fiber: because the reference suggests use with a reaction resin molding material, which lies in the region of the glass transition temperature, [See paragraph [0008] which is suggestive a carbon fiber of glass type of cooling tube/conduit since glass is made by heating carbon based materials and at the transition point some molecules would be in the form of a carbon-type tube while others would be becoming a glass type of conduit tube. The same reasons for rejection, and obviousness, that apply to **claims 1, 9, 10, 14** also apply to **claim 12** and need not be reiterated.

35. With respect to **Claim 13**, the **Dietz et al.,** reference shows the step of "positioning plurality of high modulus cylinders in the space such that each of the plurality of high modulus cylinder does not directly contact another high modulus cylinder, the first gradient coil, and the second gradient coil" from the provided figure of

the **Dietz et al.,** reference itself. Since cylinders 32 do not touch one another or any of the gradient coils. The same reasons for rejection, and obviousness, that applies to **claim 9** also apply to **claim 13** and need not be reiterated.

Prior Art of Record

36. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

A) **Feenan** US patent 6,492,816 B1 issued December 10th 2002, with an effective US date of June 7th 2001.

B) **Dachniwskyj et al.,** 5,570,021 issued October 29th 1996. [This is the prior art referred to by **Edelstein et al.**, which has epoxy between each inner and outer corresponding gradient coil set]. The examiner notes that epoxy is not viscoelastic and is different than the requirement that the viscoelastic layer be entirely foam, rubber, or foam/rubber.]

C) **Petropoulos** US patent 6,011,394 issued January 4th 2000, filed August 7th 1997.

D) **Hirata** US patent 4,594,781 issued September 4th 1990. This reference does not have the viscoelastic layer located between two separate first/second or inner/outer gradient coil assemblies as required by applicant's claims. The x, y, z, gradient coils taken together constitute a first gradient assembly. **Hirata** does not have **two separate first/second or inner/outer** gradient coil assemblies. In order to have two gradient assemblies, **Hirata** would necessarily have to have two separate sets of x, y, z, gradient coils. **Hirata** only has one set of x, y, z, gradient coils. Additionally when the location of the viscoelastic layer(s) of **Hirata** are compared to applicant's claims, the location / position of the viscoelastic component is not located where required in each of applicant's independent claims.

E) **Edelstein et al.,** 6,441,614 B1 issued August 27th 2002, filed December 2nd 1999. This reference fails to overcome applicant's amended independent claims, because **Edelstein et al.,'s** damping layer also has cement present, and applicant's after-final amended claims require that the viscoelastic damping layer is "consisting of at least one of foam or rubber" which includes within its scope only the possibilities of foam, rubber, or foam and rubber together. The use of cement by **Edelstein et al.,** eliminates this reference from being prior art against the claims of the instant application. Not available under 35 USC 103(a) because it was commonly owned / assigned at the time the invention was made.

F) **Feenan** PCT publication WO 01/25808 A1 published 12 April 2001.

G) **Feenan** US patent application Publication 2005/0134269A1 published June 23rd 2005, filed January 21st 2004, with a GB priority of December 22nd 2003. This application is not available as prior art because **applicant has an earlier effective US filing and priority date of August 18th 2003.**

H) See additionally all of the examiner's citations of the PTO form 892 attached to the office action of September 16th 2004, as each reference noted is pertinent to the claims of the instant application.

Courtesy Copy of the Currently pending claims under rejection from the newly provided IDS art of August 8th 2005

Claim 1 --- A magnetic resonance imaging (MRI) device, comprising:
an inner gradient coil assembly proximate a patient positioning area;
an outer gradient coil assembly proximate a magnet assembly; and
a damping layer sandwiched between said inner and outer gradient coil assemblies, said damping layer comprising at least one **separate** viscoelastic layer **consisting of** at least one of foam or rubber. ---

Claim 2 --- The MRI device of **claim 1**, wherein said **at least one separate viscoelastic layer comprises two separate viscoelastic layers, and said** damping layer comprises at least one high modulus cylinder sandwiched between said two **separate** viscoelastic layers. ---

Claim 3 --- The MRI device of **claim 2**, wherein said high modulus cylinder is composed of at least one of ceramic, glass filament wound tube, carbon fiber, and another non-conductive material exhibiting a high modulus. ---

Claim 5--- The MRI device of **claim 1**, further comprising at least one additional damping layer **consisting of at least one of foam or rubber** positioned between said outer gradient coil assembly and said magnet assembly. ---

Claim 6 --- The MRI device of **claim 1**, further comprising at least one additional damping layer **consisting of at least one of foam or rubber** positioned between said inner gradient coil assembly and said patient positioning area. ---

Claim 7 --- The MRI device of **claim 1**, wherein said damping layer comprises a plurality of high modulus cylinders, and wherein each of said plurality of high modulus cylinders is positioned between at least two **separate** viscoelastic layers **consisting of at least one of foam or rubber.** ---

Claim 8 --- The MRI device of **claim 1**, wherein said inner gradient coil assembly generates a magnetic field gradient in response to the presence of a magnetic field generated by said magnet assembly; and wherein said outer gradient coil assembly

shields the magnetic field gradient generated by said inner gradient coil assembly from radiating outwardly from the MRI device. ---

Claim 9 --- A method of manufacturing a magnetic resonance imaging (MRI) device, comprising:

forming a space between a first gradient coil assembly and a second gradient coil assembly;

pouring a liquid viscoelastic material **consisting of at least one of foam or rubber** into the space;

allowing the liquid viscoelastic material to solidify within the space in order to form a **separate** damping layer between the first gradient coil assembly and the second gradient coil assembly. ---

Claim 10 --- The method of **claim 9**, further comprising positioning at least one high modulus cylinder in the space before said pouring step. ---

Claim 12 --- The method of **claim 10**, wherein the high modulus cylinder is at least one of ceramic, glass filament wound tube, and carbon fiber. ---

Claim 13 --- The method of **claim 9**, further comprising positioning plurality of high modulus cylinders in the space such that each of the plurality of high modulus cylinder does not directly contact another high modulus cylinder, the first gradient coil, and the second gradient coil. ---

Claim 14 --- A magnetic resonance imaging (MRI) device, comprising:

a magnet assembly **configured to generate** a magnetic field;

a patient positioning area;

a first gradient coil assembly proximate said patient positioning area configured to produce a magnetic field gradient in response to the presence of a magnetic field generated by said magnet assembly;

a second gradient coil assembly proximate said magnet assembly configured to block the magnetic field gradient generated by said first gradient coil assembly from radiating outwardly from the MRI device; and

a damping layer sandwiched between said first and second gradient coil assemblies, wherein said damping layer comprises at least one high modulus cylinder sandwiched between two **separate** viscoelastic layers **consisting of at least one of foam or rubber**. ---

Claim 15 --- The MRI device of **claim 14,** wherein said high modulus cylinder is composed of at least one of ceramic, glass filament wound tube, and carbon fiber. ---

Claim 17 --- The MRI device of **claim 14**, further comprising at least one additional damping layer **consisting of at least one foam or rubber** positioned between said second gradient coil assembly and said magnet assembly. ---

Claim 18 --- The MRI device of **claim 14**, further comprising at least one additional damping layer **consisting of at least one of foam or rubber** positioned between said first gradient coil assembly and said patient positioning area. ---

Claim 19 --- The MRI device of **claim 14**, wherein said damping layer comprises a plurality of high modulus cylinders, and wherein each of said plurality of high modulus cylinders is positioned between at least two **separate** viscoelastic layers **consisting of at least one of foam or rubber**. ---

Claim 20 --- The MRI device of **claim 14**, further comprising a radiofrequency (RF) coil assembly **configured to** transmit a radiofrequency pulse and detect a plurality of MR signals induced from a subject being imaged. ---

Conclusion

37. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiffany Fetzner whose telephone number is: (571) 272-2241. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.

38. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez, can be reached at (571) 272-2245. The **only official fax phone number** for the organization where this application or proceeding is assigned is **(571) 273-8300**.

Tiffany A. Fetzner

TAF
September 29, 2005

Diego Gutierrez
Supervisory Patent Examiner
Technology Center 2800